CHU Hôpitaux de Bordeaux

IMS XAVIER ARROZAN — 7, 8 ET 9 DÉCEMBRE 2016

JARCA 2016

Journées d'Anesthésie Réanimation Chirurgicale d'Aquitaine

Réa Tho Magellan

Sevrage ventilatoire nouveautés/monitorage

Hadrien Rozé

Anesthésie Réanimaton Thoracique

SAR2, Centre Médico chirurgicale Magellan,

Hôpital Haut Leveque, groupe hospitalier Sud

CHU de Bordeaux

SimVA

Sevrage 3 situations

1) Sevrage simple (premier essai)

65%

2) Sevrage prolongé (plus d'un essai)

25%

3) Sevrage (très) difficile

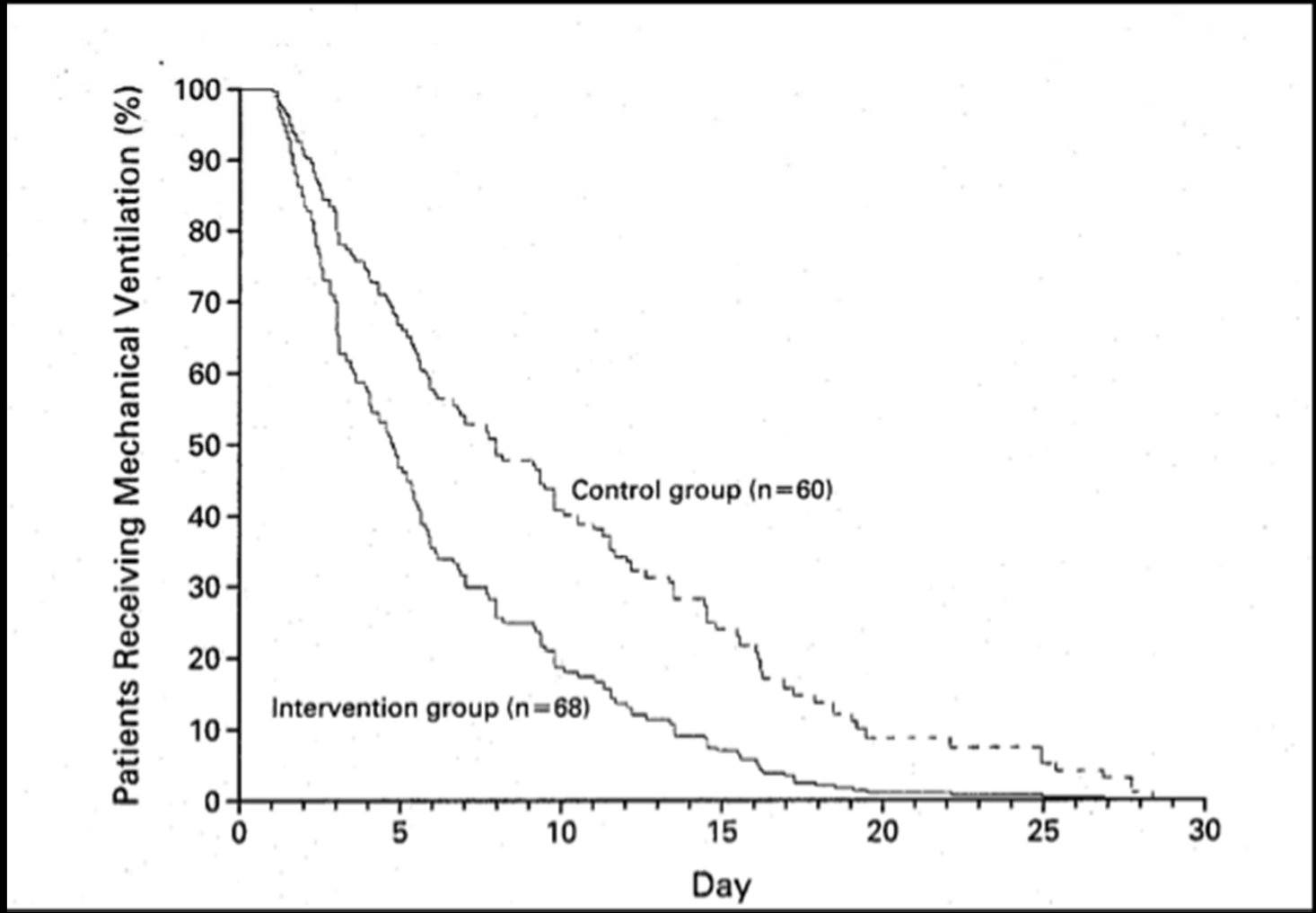
10%

Mécanismes du Sevrage difficile

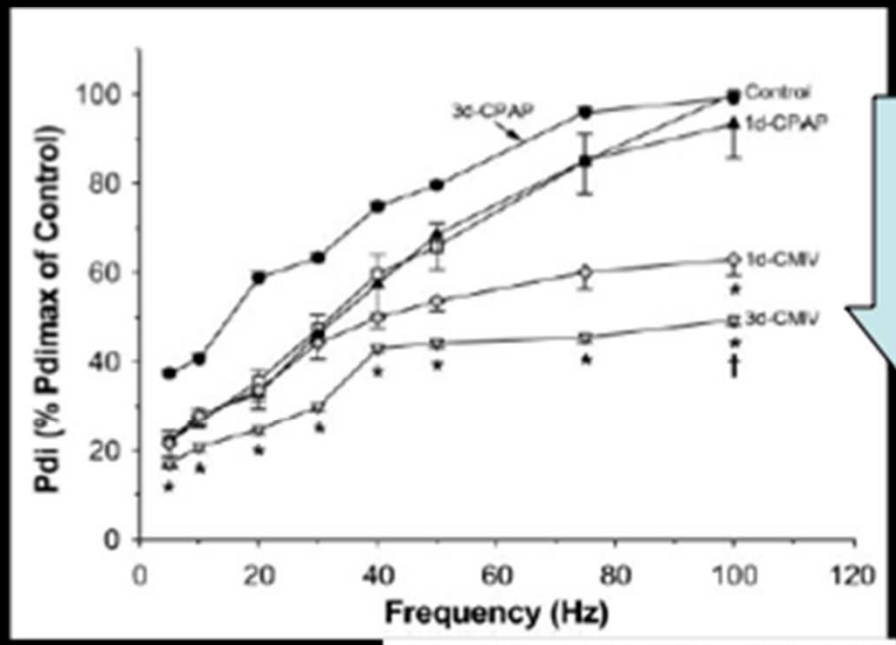
- Pathologie pulmonaire/cardiaque sous jacente sévère
- Surcharge volémique
- Faiblesse musculaire respiratoire
- Métabolique/Nutrition/Anémie

Protocole de sedation

Kress, JP. et al. N Engl J Med 2000; 342:1471-1477

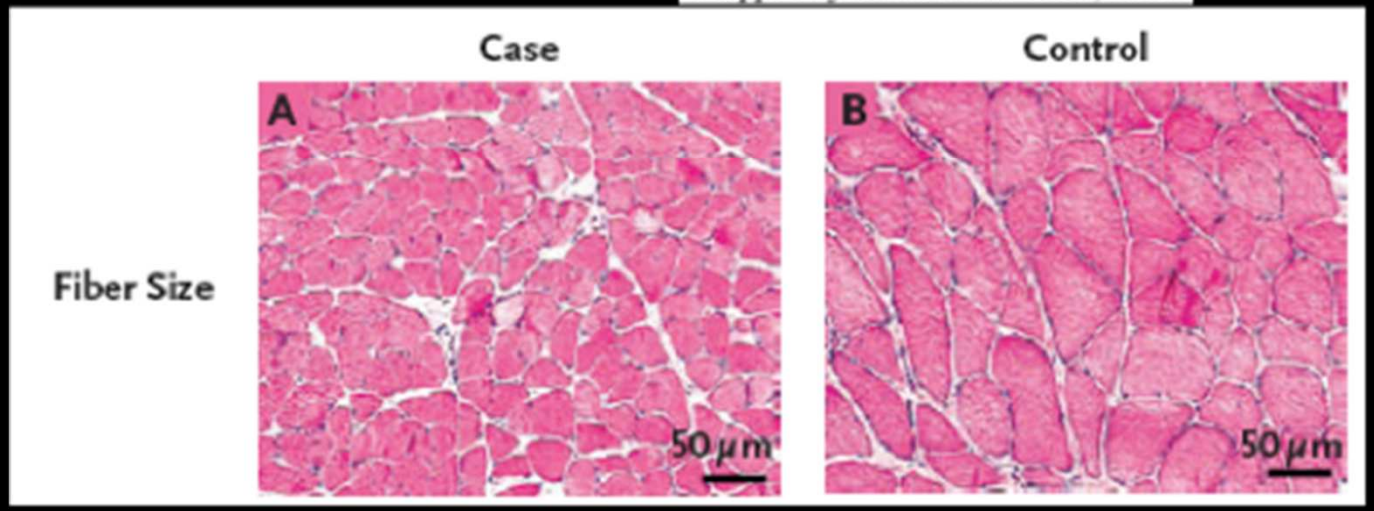


Faiblesse musculaire



Force

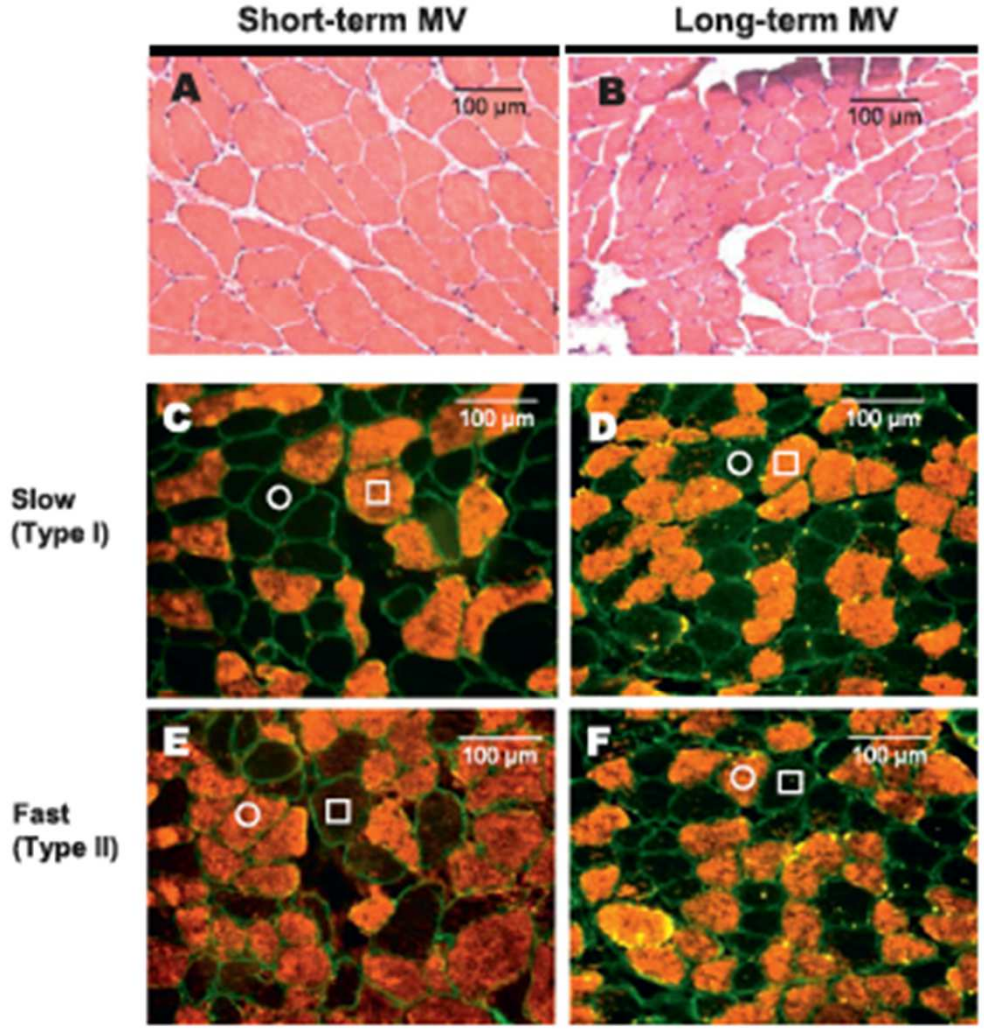
J Appl Physiol 92: 2585–2595, 2002.

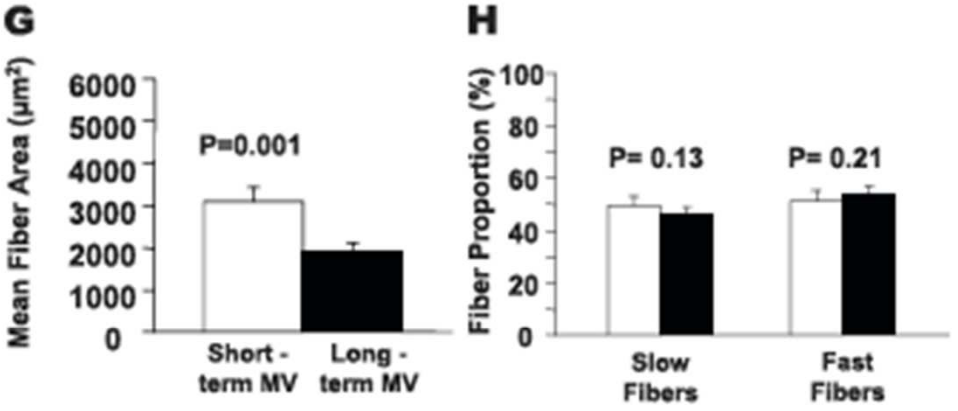


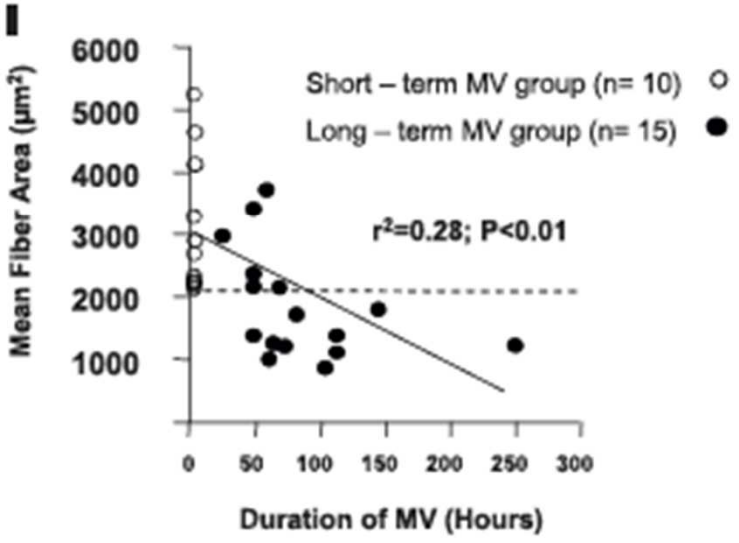
N Engl J Med 2008;358:1327-35.

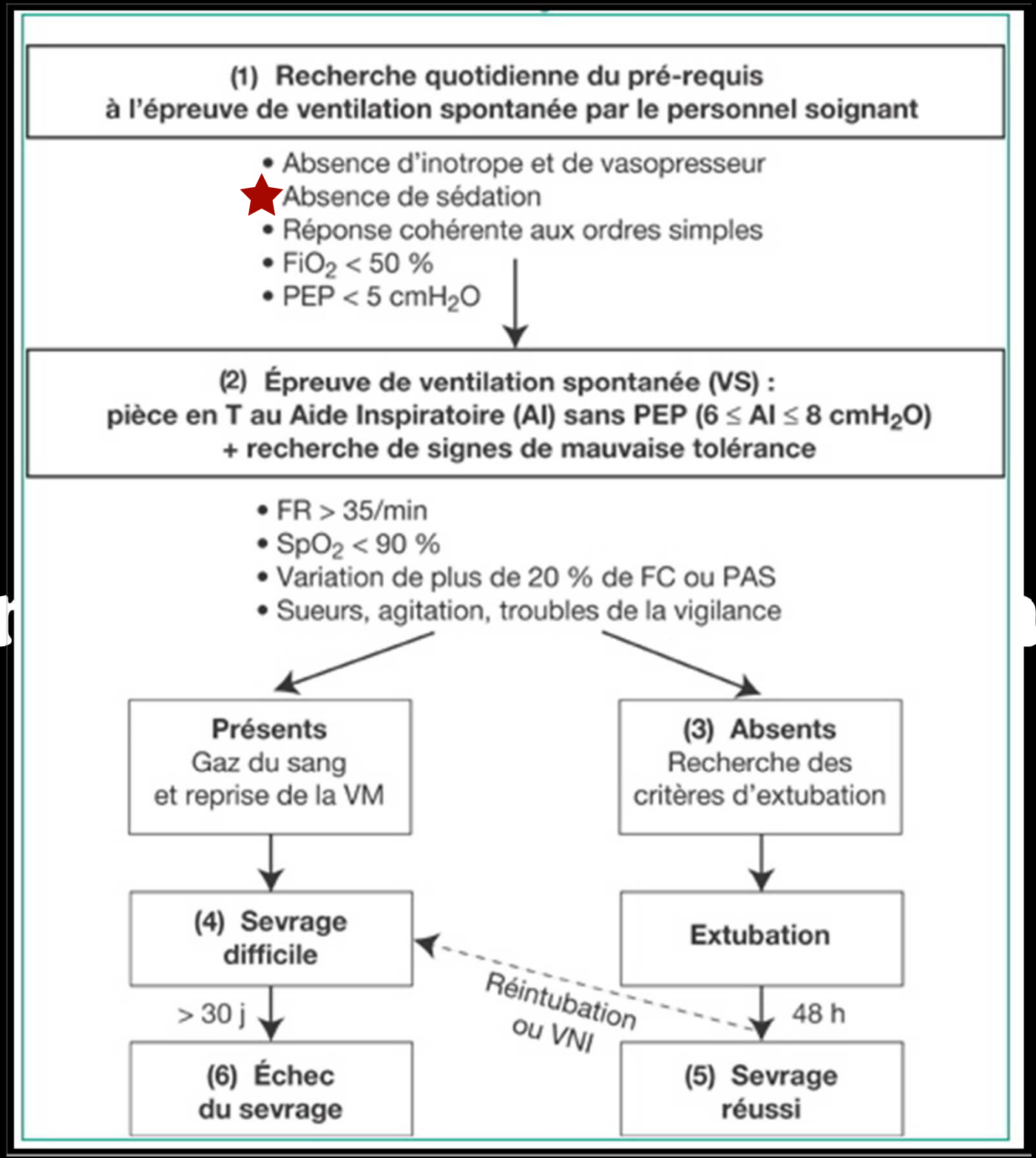
Rapidly Progressive Diaphragmatic Weakness and Injury during Mechanical Ventilation in Humans

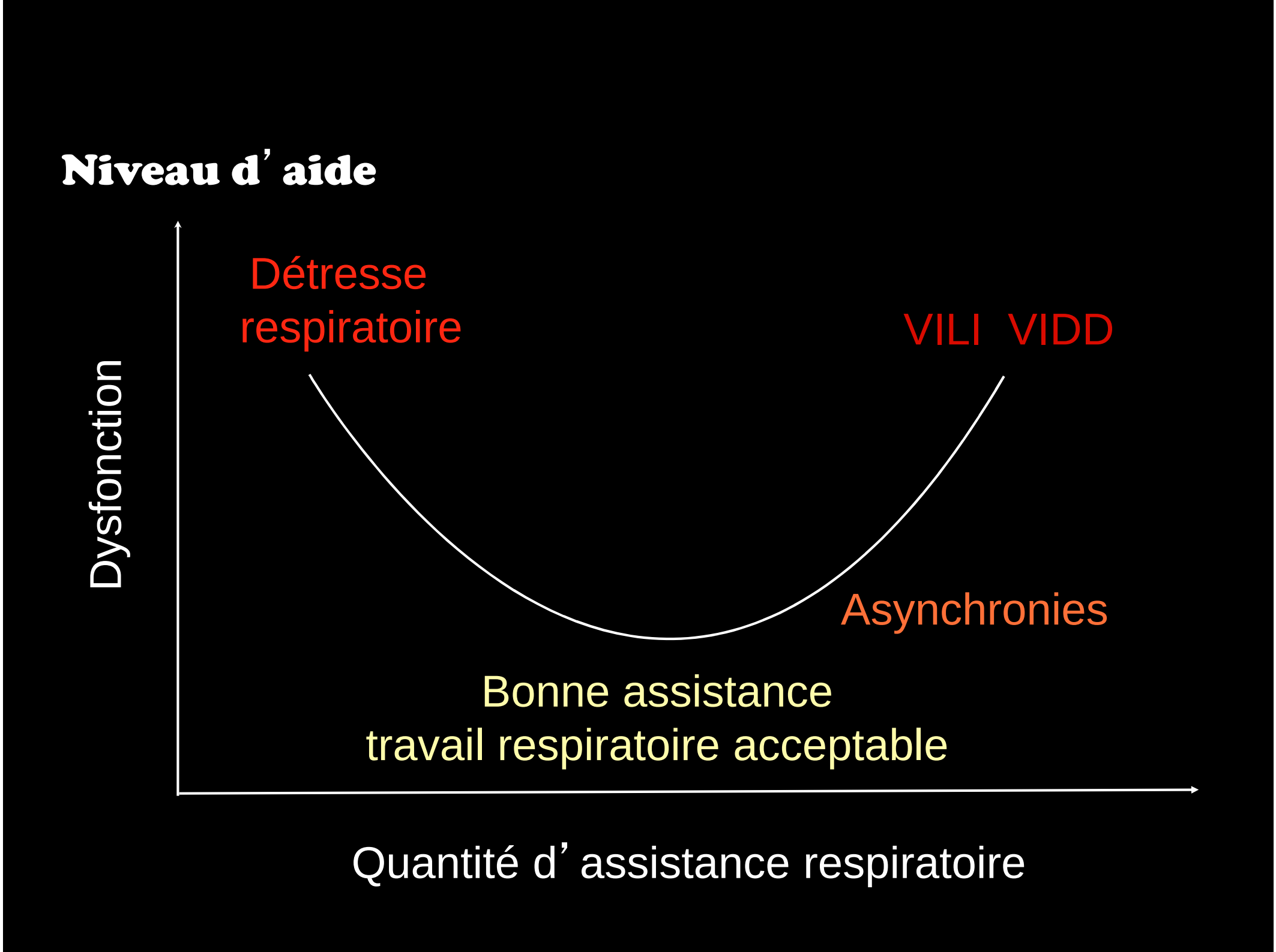
Samir Jaber[1,2,6], Basil J. Petrof[3], Boris Jung[1,2], Gérald Chanques[1,2], Jean-Philippe Berthet[4], Christophe Rabuel[5], Hassan Bouyabrine[6], Patricia Courouble[1,2], Christelle Koechlin-Ramonatxo[7], Mustapha Sebbane[1,2], Thomas Similowski[8], Valérie Scheuermann[9], Alexandre Mebazaa[5], Xavier Capdevila[1,2], Dominique Mornet[2], Jacques Mercier[2,10], Alain Lacampagne[9], Alexandre Philips[2], and Stefan Matecki[2,10]







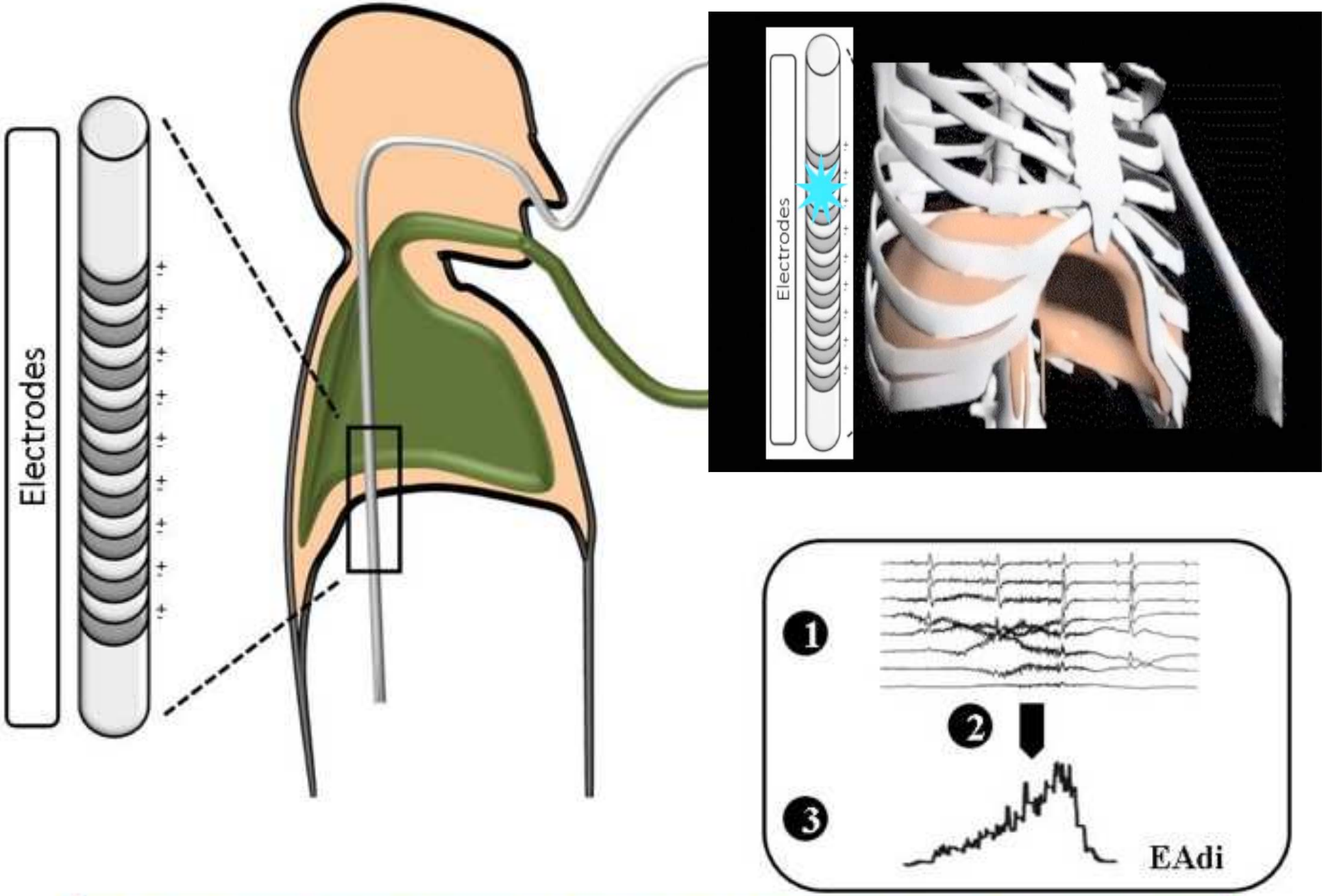

(1) Recherche quotidienne du pré-requis
à l'épreuve de ventilation spontanée par le personnel soignant
• Absence d'inotrope et de vasopresseur
• Absence de sédation
• Réponse cohérente aux ordres simples
• FiO_2 < 50 %
• PEP < 5 cmH_2O
(2) Épreuve de ventilation spontanée (VS) :
pièce en T au Aide Inspiratoire (AI) sans PEP (6 ≤ AI ≤ 8 cmH_2O)
+ recherche de signes de mauvaise tolérance
• FR > 35/min
• SpO_2 < 90 %
• Variation de plus de 20 % de FC ou PAS
• Sueurs, agitation, troubles de la vigilance
Présents
Gaz du sang
et reprise de la VM
(3) Absents
Recherche des
critères d'extubation
(4) Sevrage
difficile
Extubation
> 30 j
Réintubation
ou VNI
48 h
(6) Échec
du sevrage
(5) Sevrage
réussi


Niveau d'aide
Dysfonction
Détresse
respiratoire
VILI VIDD
Asynchronies
Bonne assistance
travail respiratoire acceptable
Quantité d'assistance respiratoire

Problématiques du mode lors du sevrage

- Synchroniser le patient au respirateur/limiter les asynchronies, améliorer le confort
- Adapter l’ aide inspiratoire aux besoins du patient
  - VSAI: aide fixe à adapter manuellement
  - Monitorage EAdi en VSAI
  - Neurally Adjusted Ventilatory Assist: NAVA
  - Proportionnal Assist Ventilation: PAV+

L’electricité

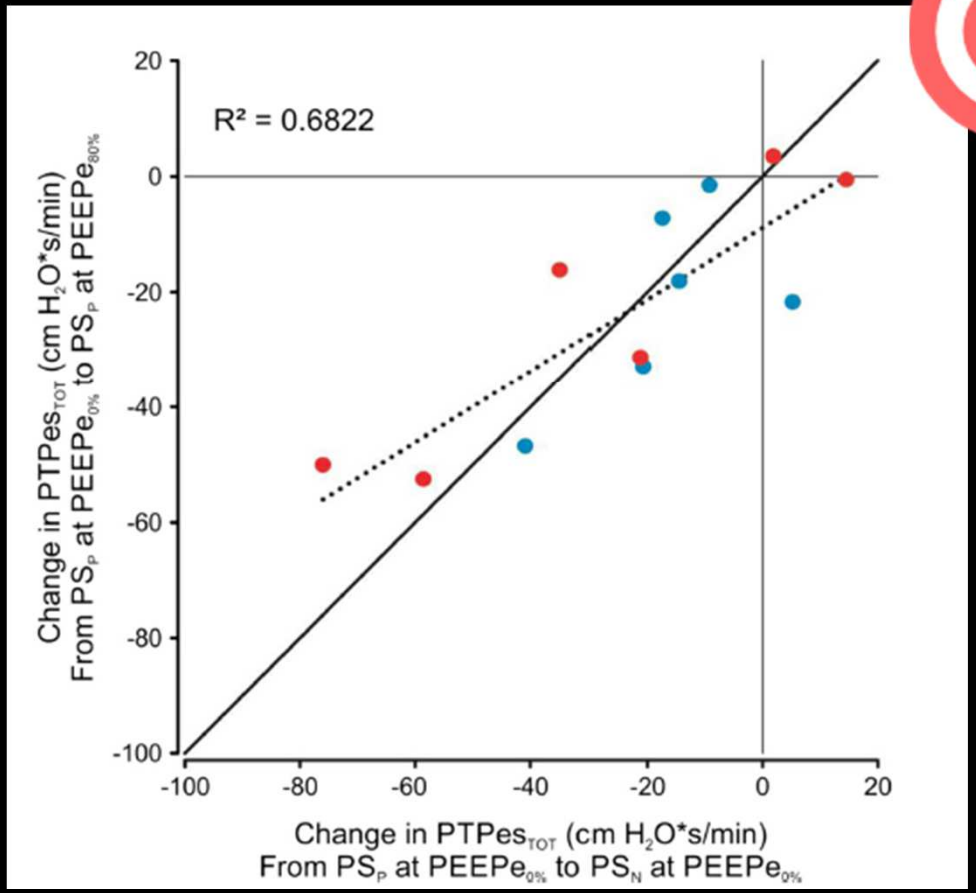

Electrodes
Electrodes
1
2
3
EAdi


PP 56 kg
21:23
24/04/14
>45 min
AI/VS PEP ⇄ PC
30s
ATTENTE
MODES
LIMITES D'ALARME
MANŒUVRES
AFFICHAGES
NAVA
DÉBRANCHEMENT /ASPIRATION
TENDANCES & JOURNAUX
PRESSION/P
DÉBIT l/min
VOLUME ml
Edi µV
Pcrête
28
cmH2O
PEP
9,1
cmH2O
Pmoyen.
13
cmH2O
FR
35
resp/min
Ti/Ttot
0,32
Conc. O2
41
%
Vce
349
ml
Vci
339
ml
VMe
11,8
l/min
Edimax
7,2
µV
Edimin
0,2
µV
Vc/PP
6,3
ml/kg
100
O2 SUPP.
Conc. O2
40
PEP
9,0
Niv. AI sur PEP
18
FR ventil. apnée
15
PC d'apnée sur PEP
15
Durée d'apnée
20
Fin d'insuff.
50
I:E d'apnée
1 : 2
Pentetps insp. (s)
0,15
Trigger (l/min)
1,6

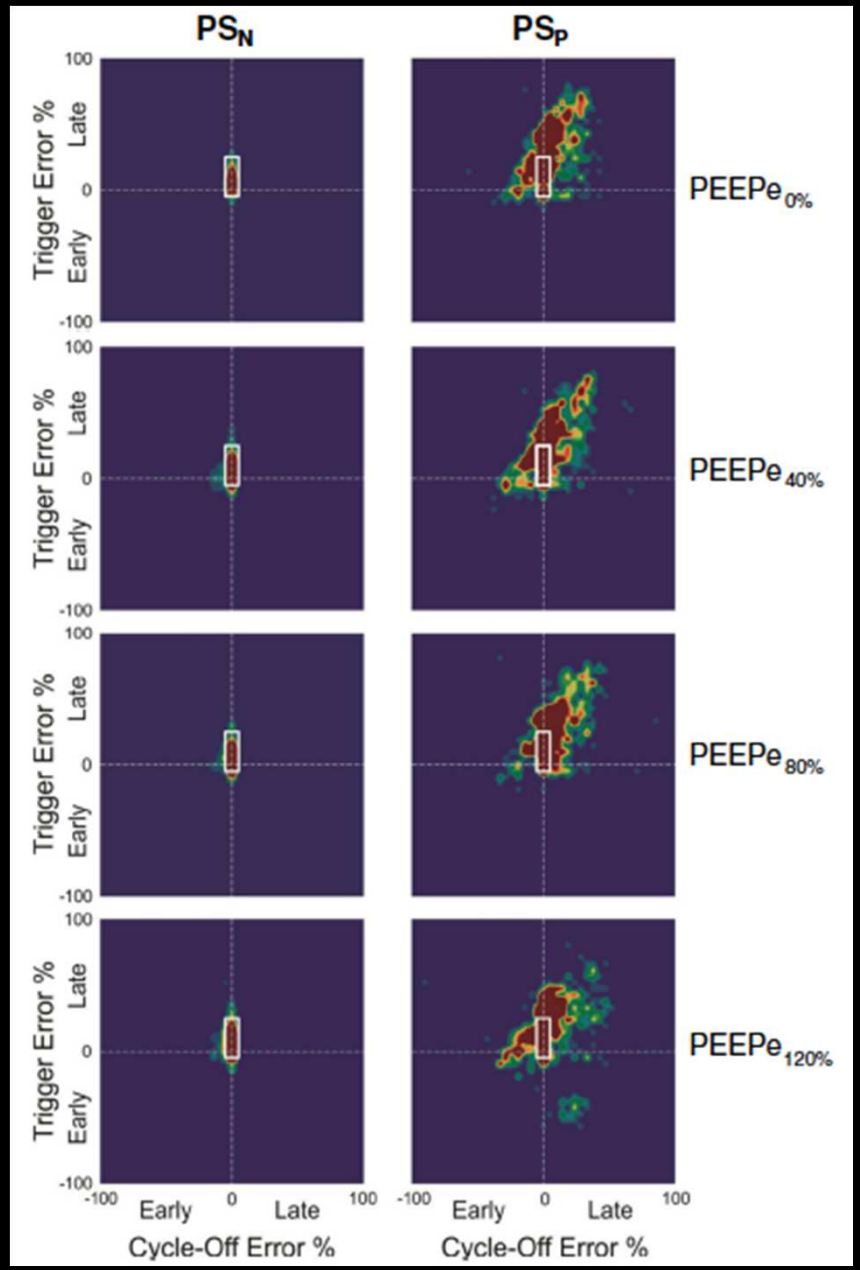
RESEARCH Open Access

Neural versus pneumatic control of pressure support in patients with chronic obstructive pulmonary diseases at different levels of positive end expiratory pressure: a physiological study

Ling Liu[1†], Feiping Xia[1†], Yi Yang[1], Federico Longhini[1,2], Paolo Navalesi[2,3,4], Jennifer Beck[5,6,8], Christer Sinderby[5,7,8] and Haibo Qiu[1*]



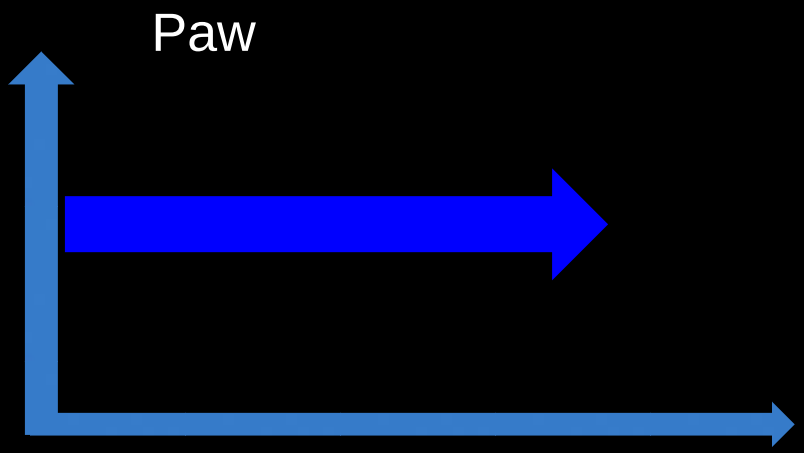
VSAI neuro VSAI pneu

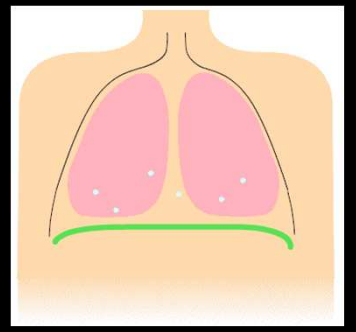


Liu *et al. Critical Care* (2015) 19:244

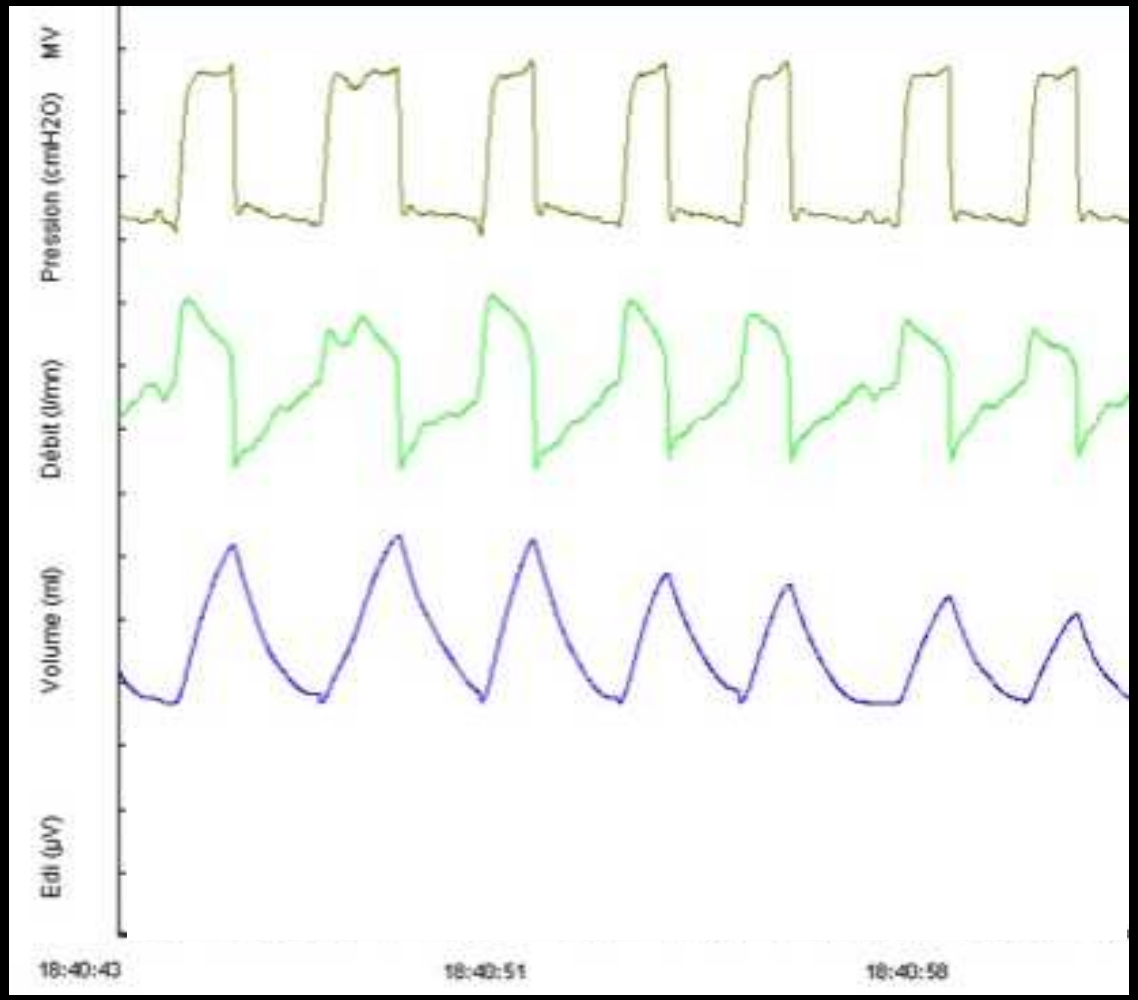
VSAI

Pas de proportionnalité

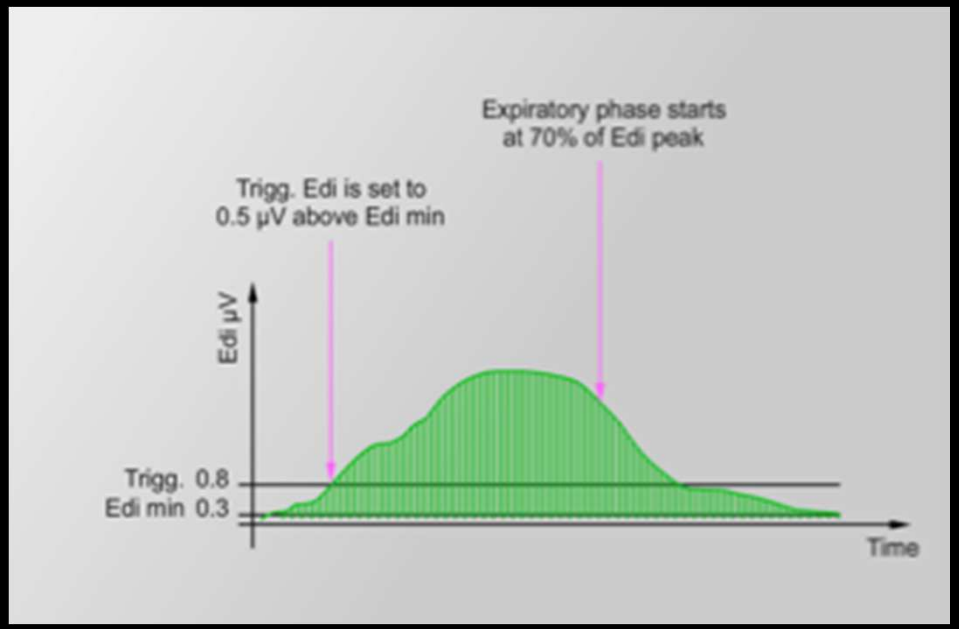




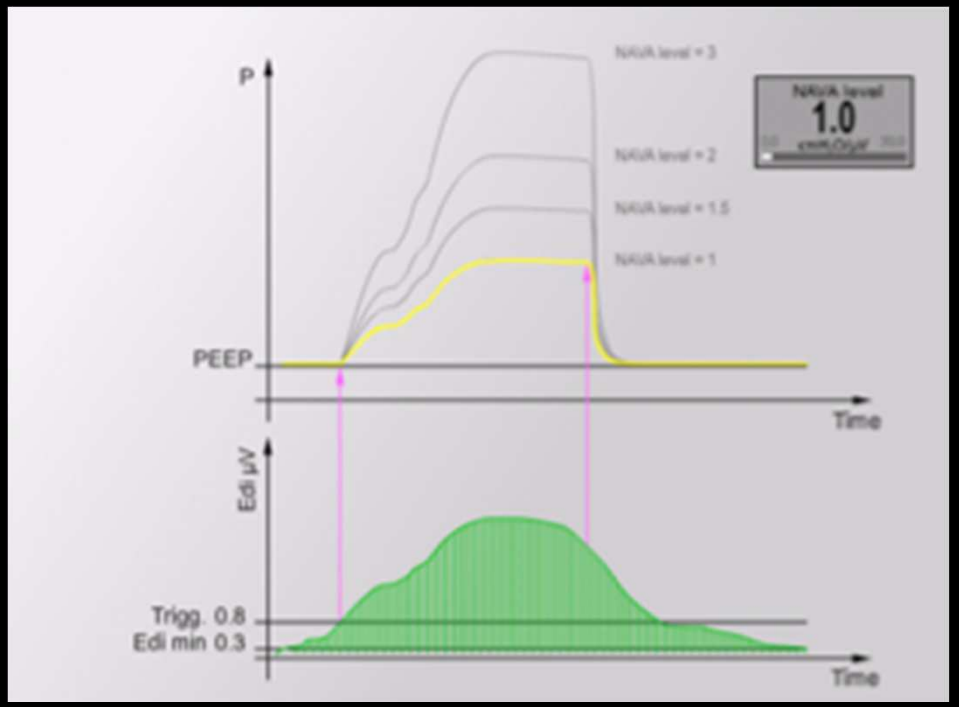
Effort patient



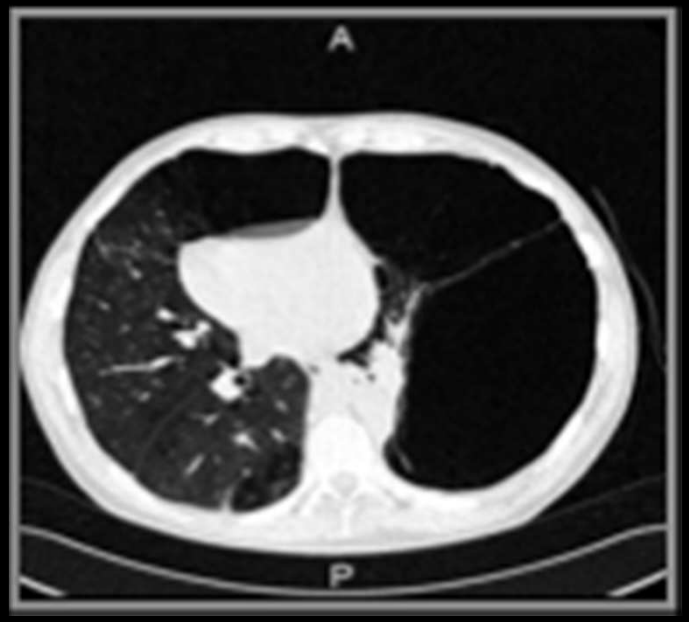
Cyclage électrique



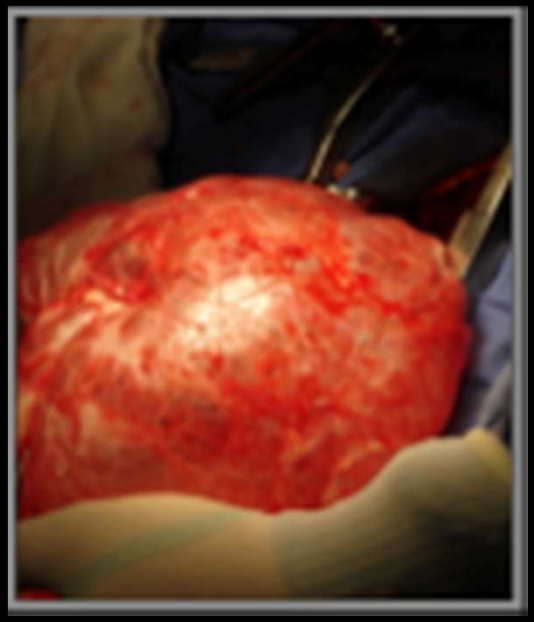
Aide:
Niveau NAVA
cmH_2O/µvolt

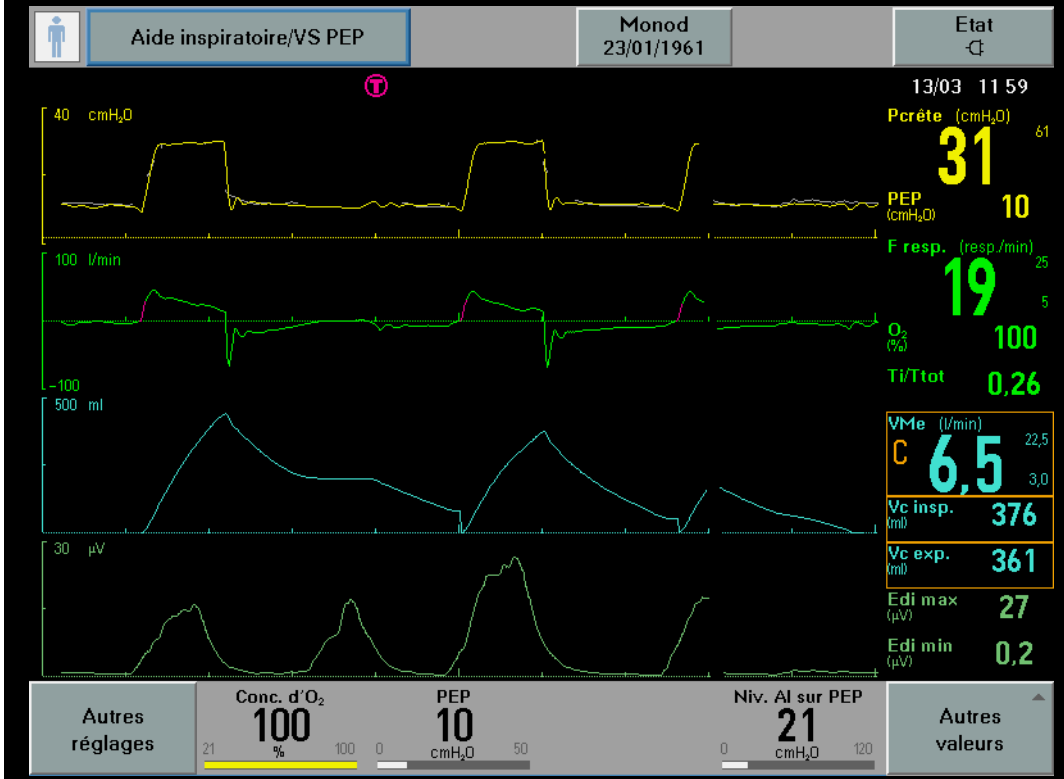


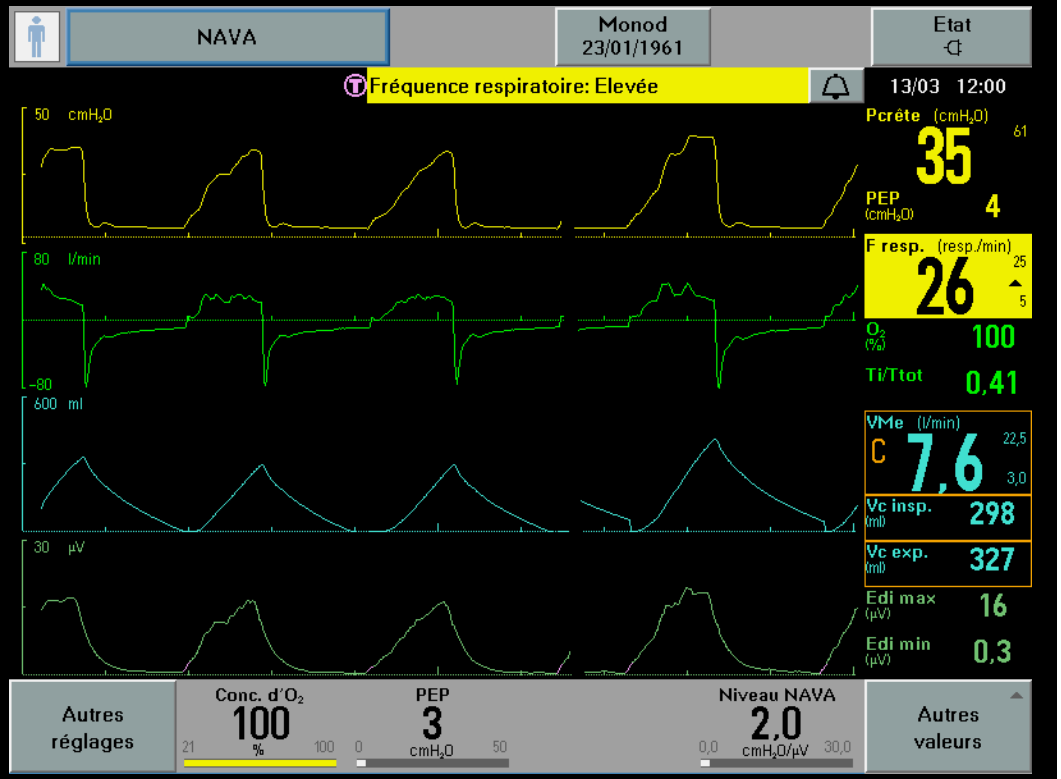

!
PP 56 kg
08:14
28/04/14
>45 min
NAVA ⇄ AI ⇄ PC
30s
ATTENTE
MODES
LIMITES D'ALARME
MANŒUVRES
AFFICHAGES
NAVA
DÉBRANCHEMENT /ASPIRATION
TENDANCES & JOURNAUX
30 PRESSION cmH2O
-3
60 DÉBIT
-60
550 VOLUME ml
0
20 Edi µV
0
Pcrête 30
22
cmH2O
PEP 15 0
3,8
cmH2O
Pmoyen.
9
cmH2O
FR 48 8
33
resp/min
Ti/Ttot
0,38
Conc. O2
40
%
Vce
507
ml
Vci
466
ml
VMe 17,0 5,0
11,5
l/min
Edimax
9,8
µV
Edimin
0,2
µV
Vc/PP
9,1
ml/kg
100
O2 SUPP.
Conc. O2
40
PEP
4,0
Niveau NAVA
1,6
Niv. AI sur PEP
15
FR ventil. apnée
15
PC d'apnée sur PEP
15


A
P

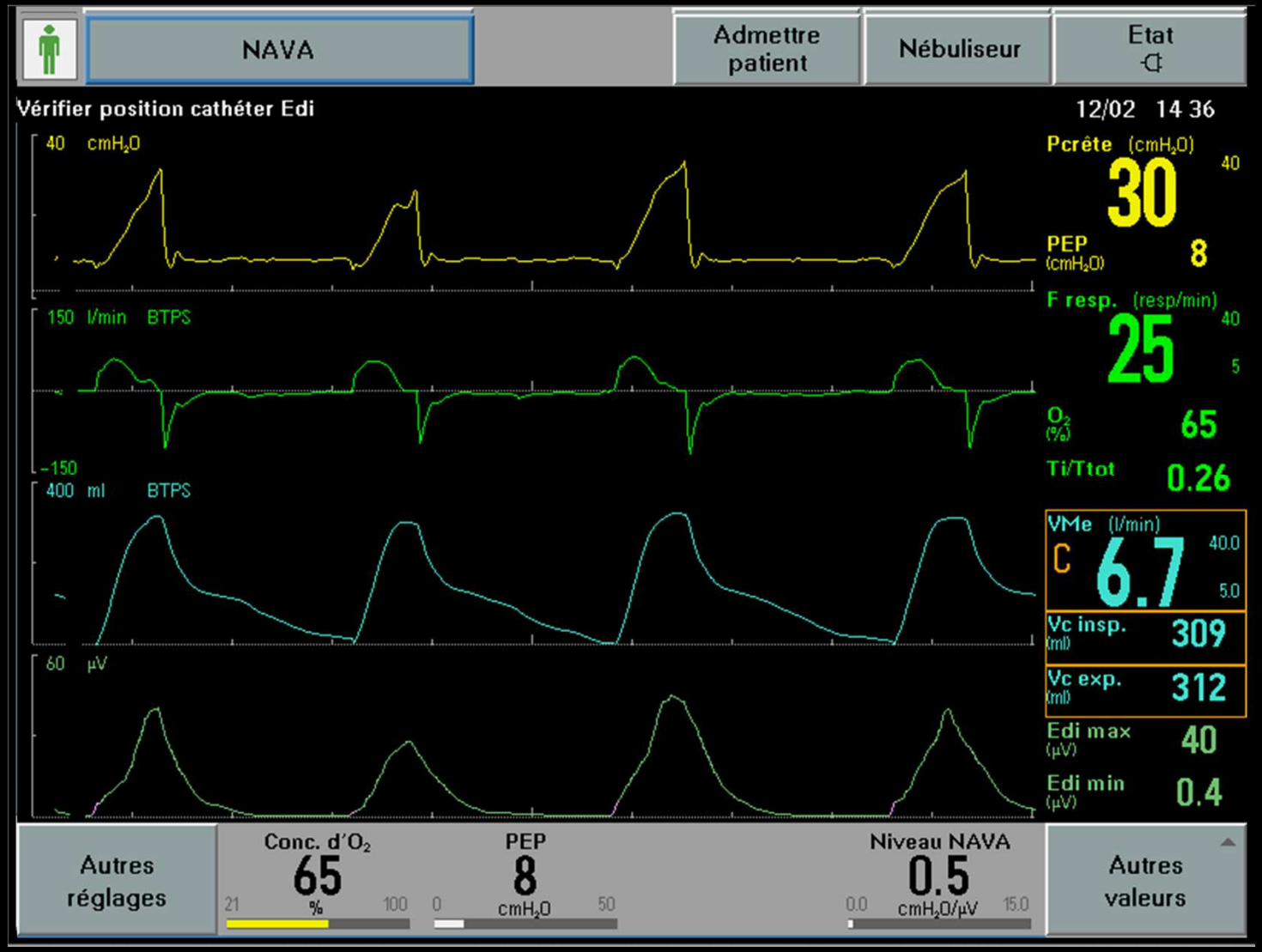
BPCO




Aide inspiratoire/VS PEP
Monod
23/01/1961
Etat
13/03 11 59
40 cmH2O
Pcrête (cmH2O)
31
61
PEP (cmH2O)
10
100 l/min
-100
F resp. (resp./min)
19
25
5
O2 (%)
100
Ti/Ttot
0,26
500 ml
VMe (l/min)
C 6,5
22,5
3,0
Vc insp. (ml)
376
30 µV
Vc exp. (ml)
361
Edi max (µV)
27
Edi min (µV)
0,2
Autres réglages
Conc. d'O2
100
%
PEP
10
cmH2O
Niv. AI sur PEP
21
cmH2O
Autres valeurs


NAVA
Monod
23/01/1961
Etat
Fréquence respiratoire: Elevée
13/03 12:00
50 cmH2O
Pcrête (cmH2O)
35
61
PEP (cmH2O)
4
80 l/min
-80
F resp. (resp./min)
26
25
5
O2 (%)
100
Ti/Ttot
0,41
600 ml
VMe (l/min)
C 7,6
22,5
3,0
Vc insp. (ml)
298
30 µV
Vc exp. (ml)
327
Edi max (µV)
16
Edi min (µV)
0,3
Autres réglages
Conc. d'O2
100
%
PEP
3
cmH2O
Niveau NAVA
2,0
cmH2O/µV
Autres valeurs

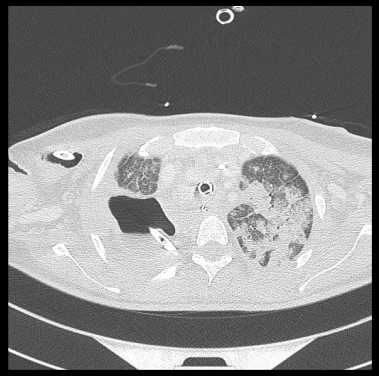
Fibrose pulmonaire

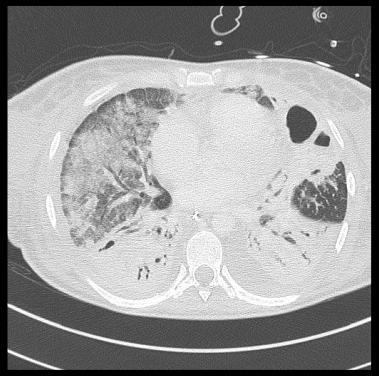


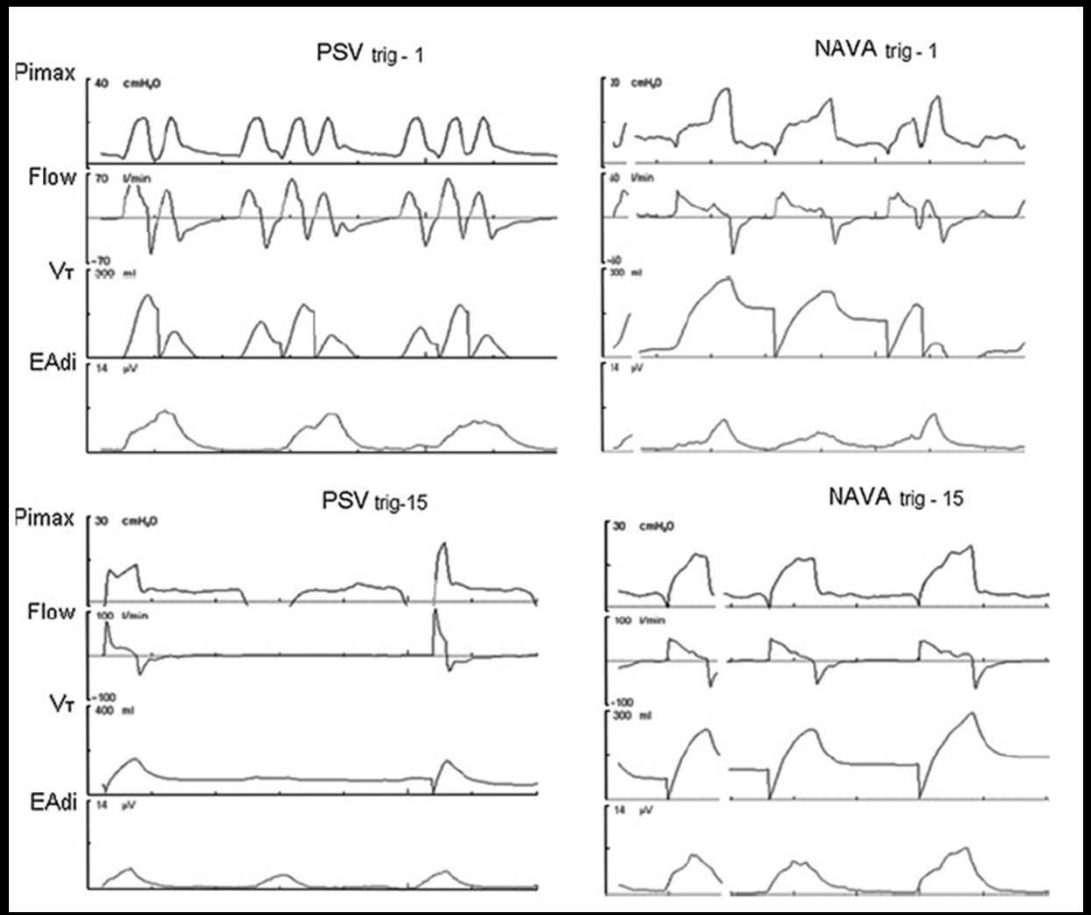
Use of neural trigger during neurally adjusted ventilatory assist in a patient with a large broncho-pleural fistula and air leakage

Hadrien Rozé
Alexandre Ouattara

Intensive Care Med (2012) 38:922–923



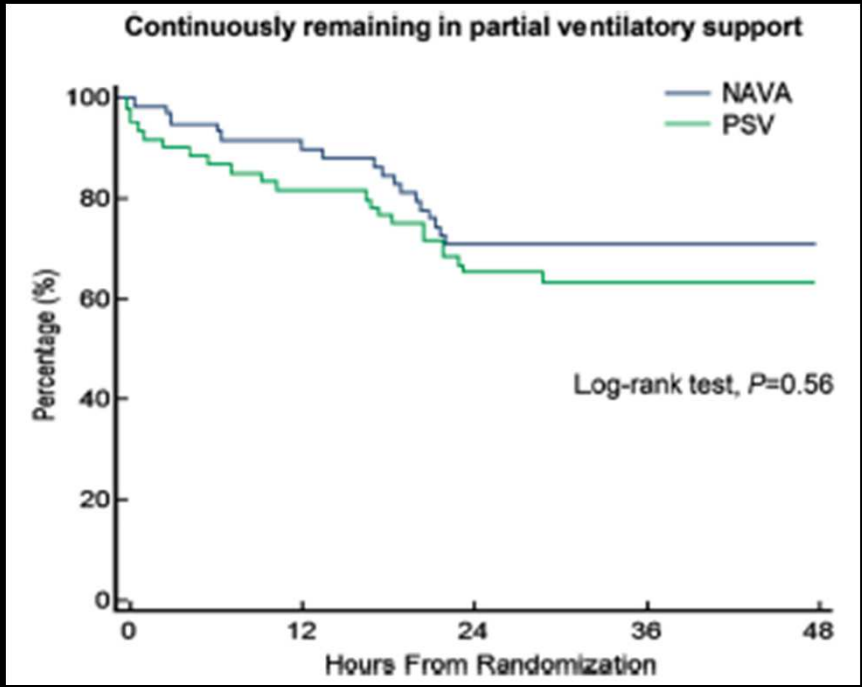


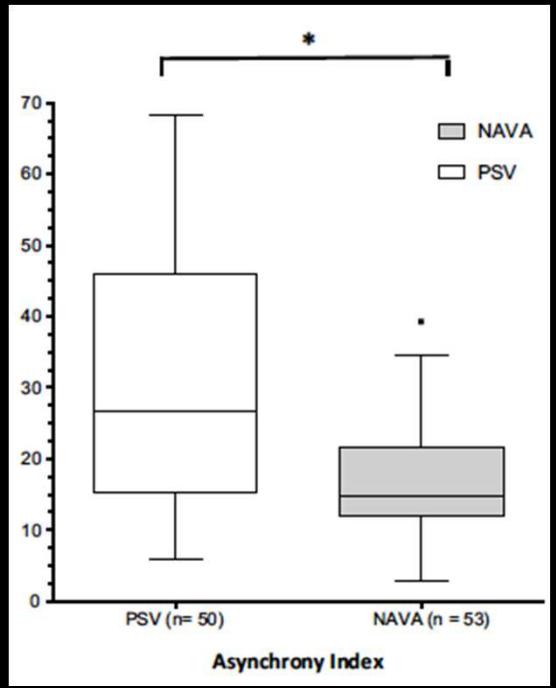


ORIGINAL

Neurally adjusted ventilatory assist as an alternative to pressure support ventilation in adults: a French multicentre randomized trial

A. Demoule[1,2*], M. Clavel[3], C. Rolland-Debord[1,2], S. Perbet[4,5], N. Terzi[6,7], A. Kouatchet[8], F. Wallet[9,10], H. Roze[11], F. Vargas[12], C. Guerin[13], J. Dellamonica[14,15], S. Jaber[16,17], L. Brochard[18,19] and T. Similowski[1,2]





Moins de dyspnée dans le groupe NAVA à J1

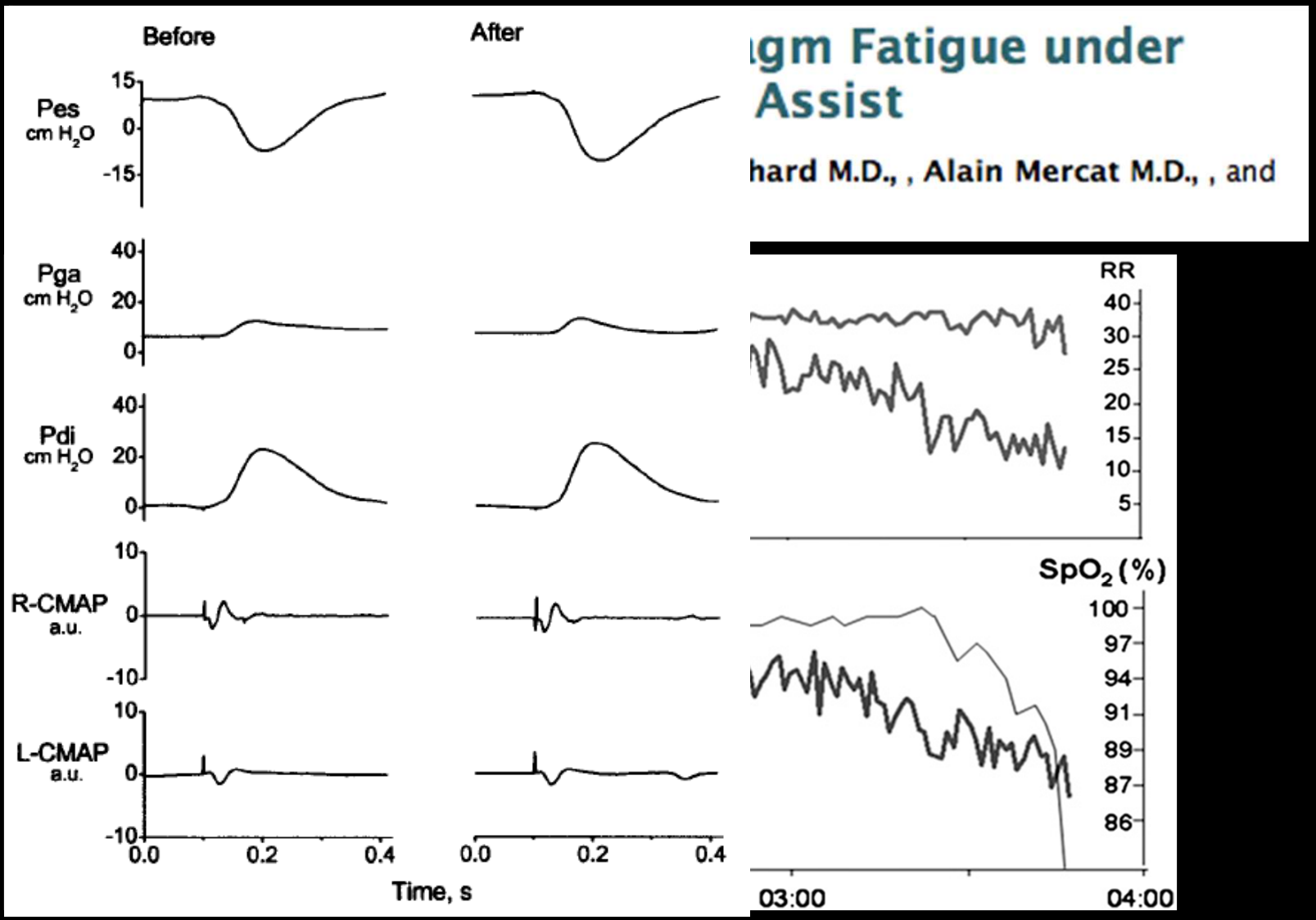
Intensive Care Med (2016) 42:1723–1732

Is Weaning Failure Caused by Low-Frequency Fatigue of the Diaphragm?

Voir de la fatigue ?

Franco Laghi, Steven E. Cattapan, Amal Jubran, Sairam Parthasarathy, Paul Warshawsky, Yoon-Sub A. Choi, and Martin J. Tobin

Am J Respir Crit Care Med Vol 167. pp 120–127, 2003

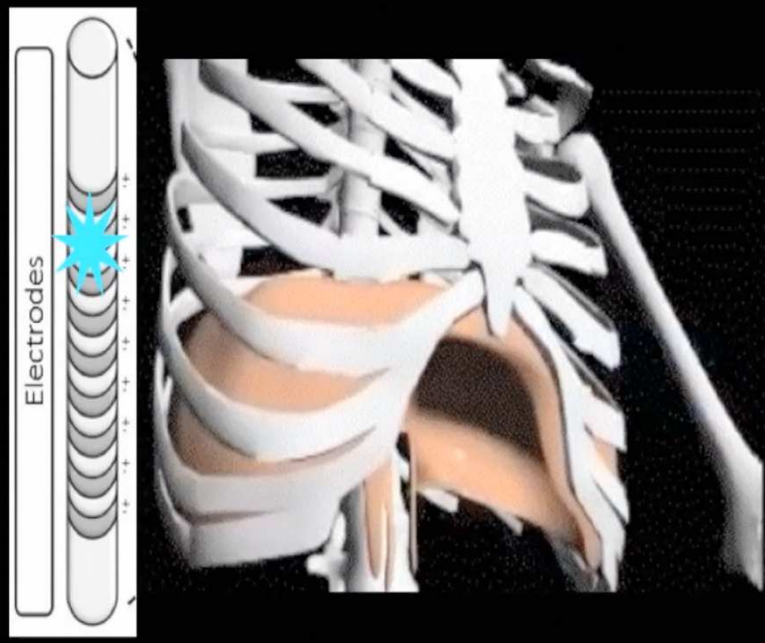


gm Fatigue under
Assist

hard M.D., , Alain Mercat M.D., , and

Rozé et al. ICM 2011

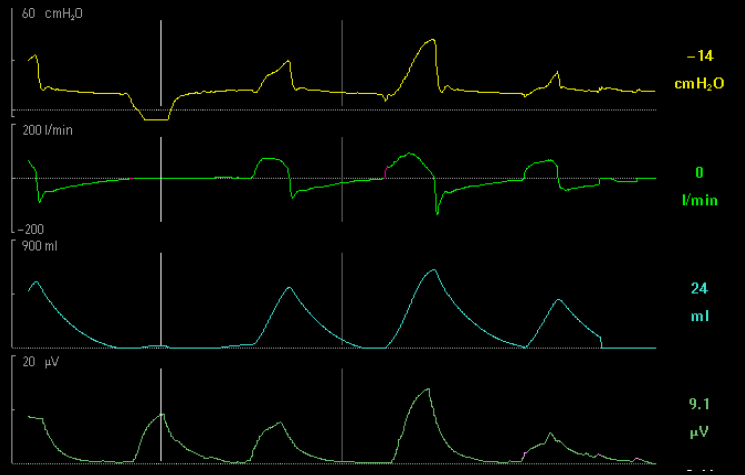
EN NAVA



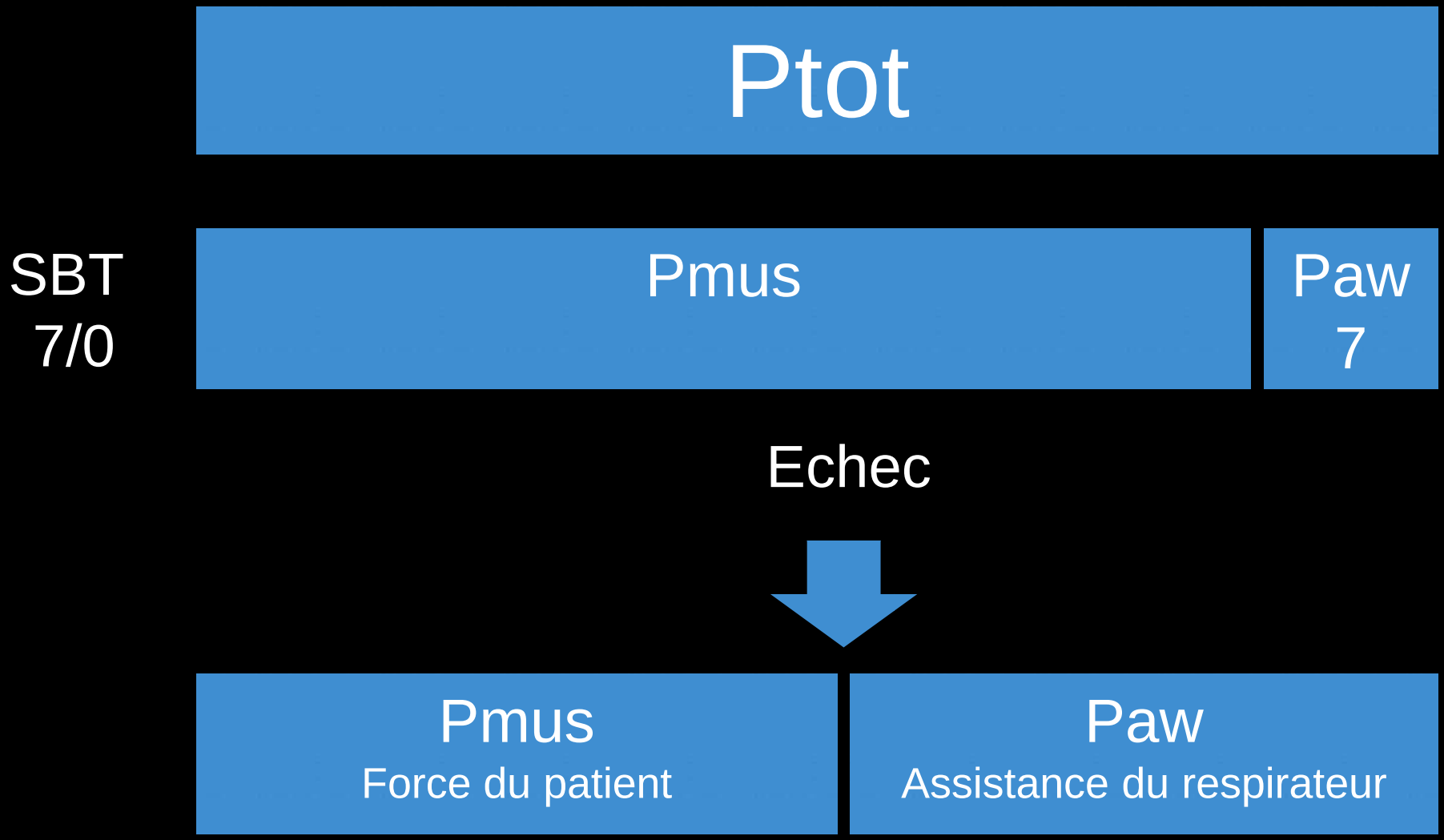
- Pmus=K x Activation
- donc Pdi = K x EAdi
- **Paw=NAVA level x Eadi**

Pression Electricité Index

- PEI= Poccl/EAdi/1,5
- Pmus=PEI x EAdi

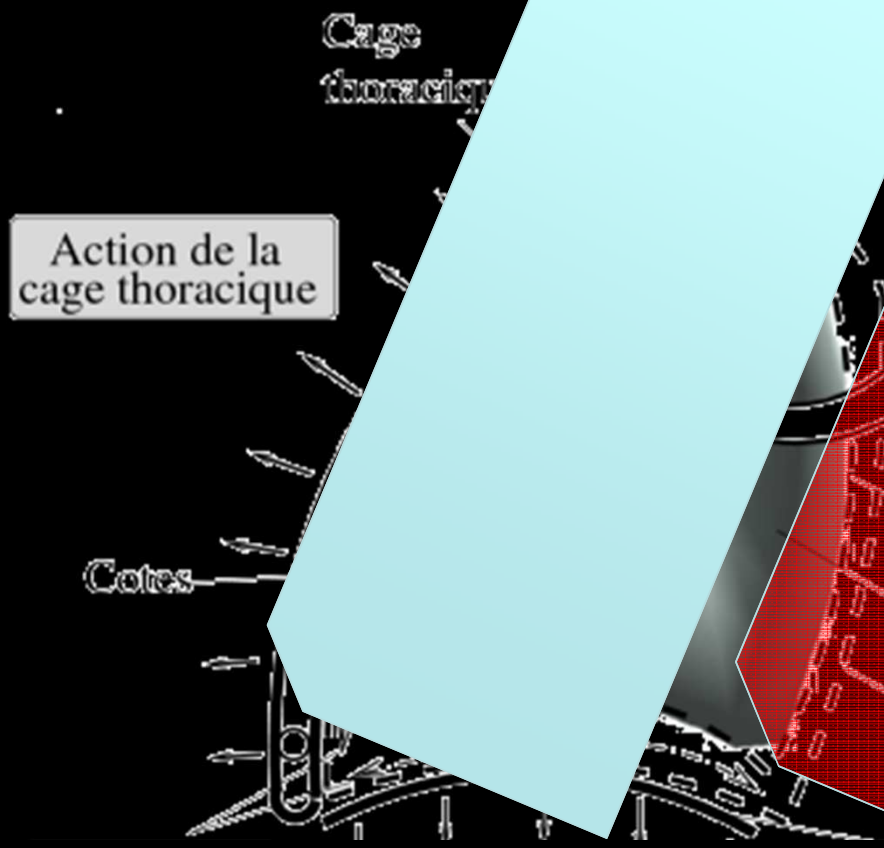


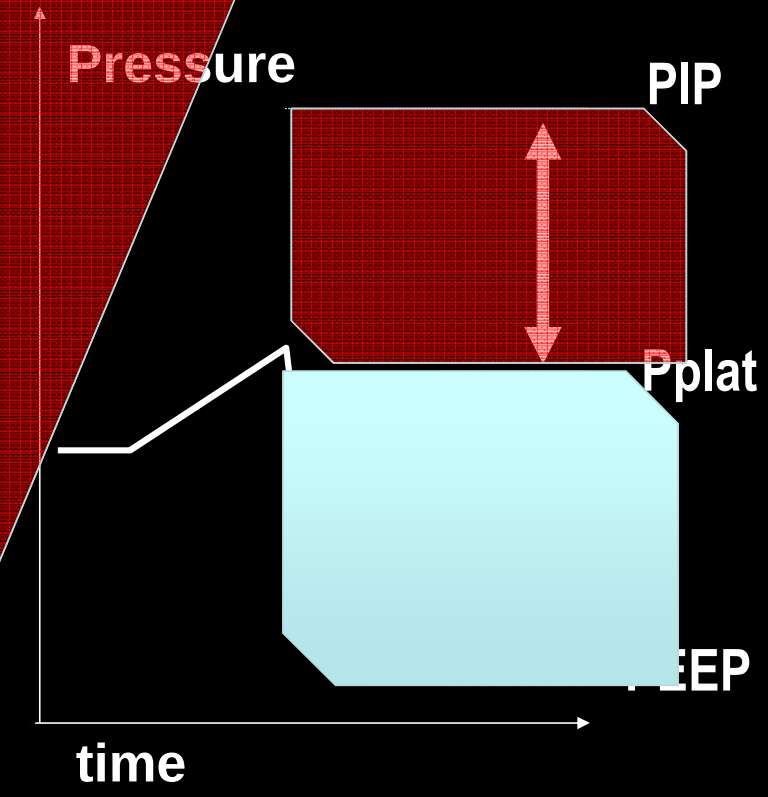
En VS Ptot=Paw+Pmus



- Rappel: Equation du mouvement du poumon :

Palv = PEP + (Débit x Res)





Equation

$$P\,tot_{(t)} = R \cdot Débit_{(t)} + 1/C \cdot Volume_{(t)}$$

- Ptot = Pmus + Paw

Ventilation proportionnelle en PAV car

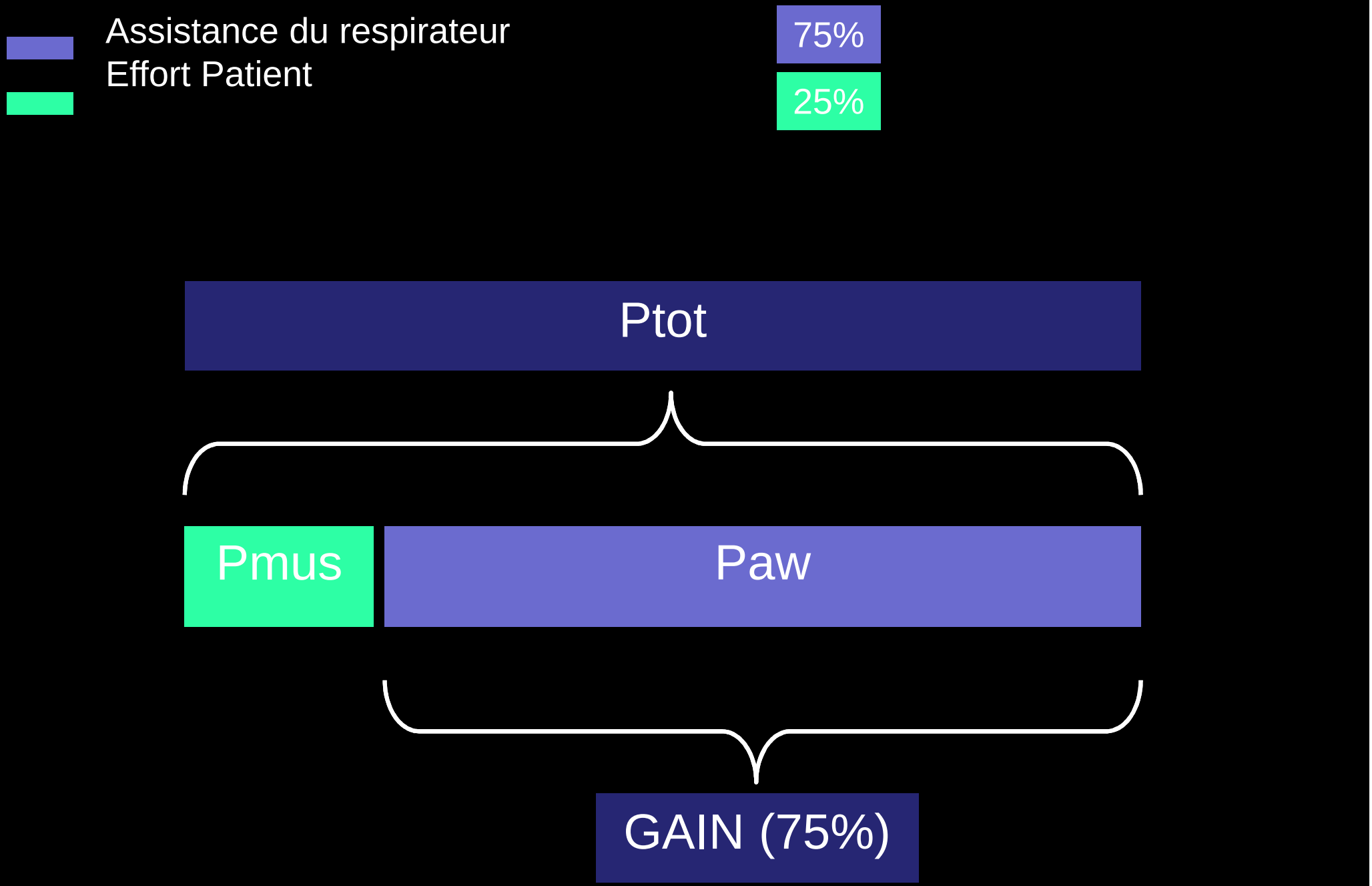
Paw = K.Ptot

Si les forces opposées à la ventilation varient
L'assistance respiratoire varie en proportion

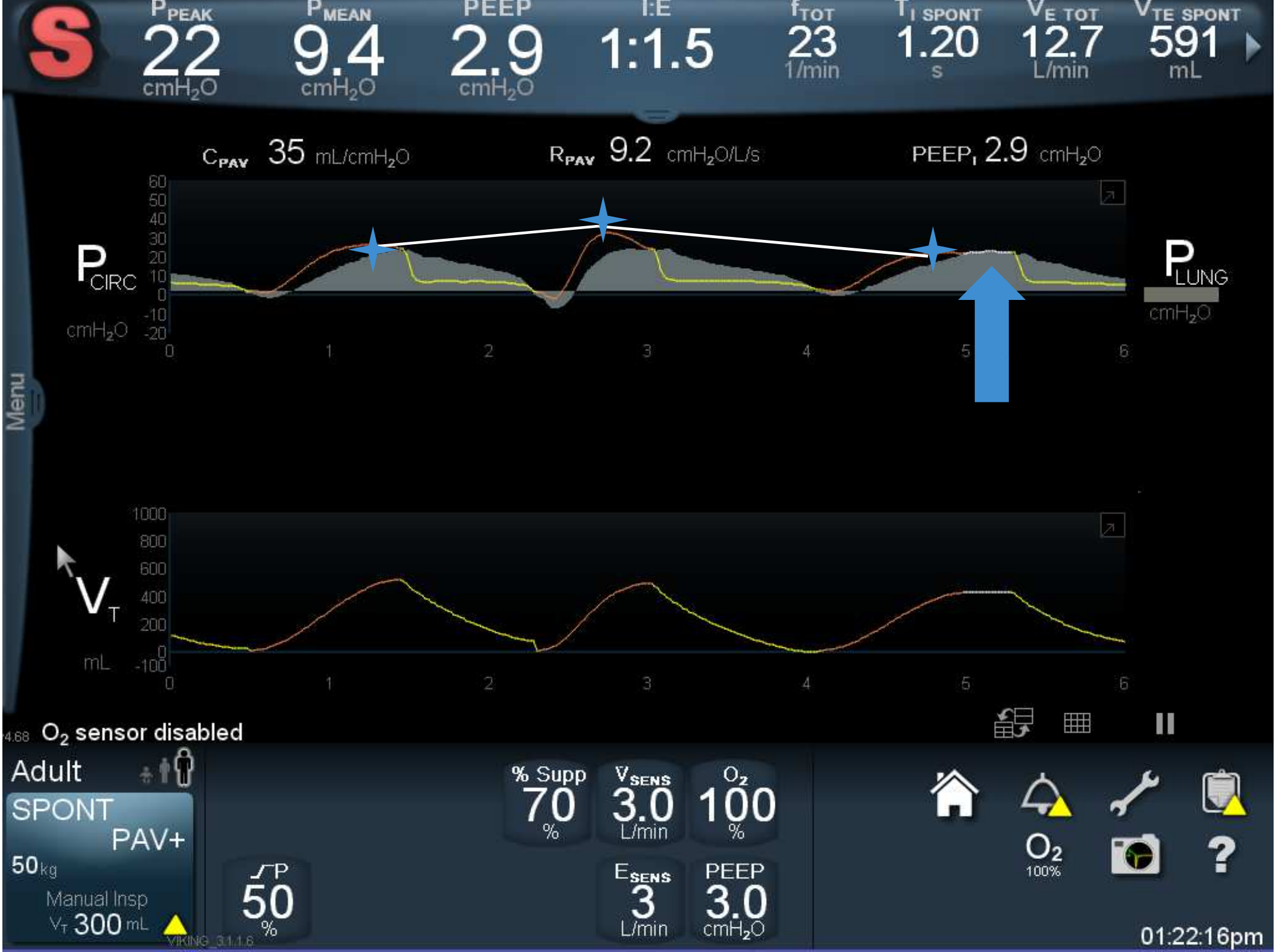
Paw(t) = Gain (%) (R.Débit(t) + E.Volume(t))

Pmus = Paw . (Gain/(1-Gain))

- Amplificateur d'assistance (Paw) lié à l'effort (Pmus) pour compenser, en partie, la compliance et la résistance du système thoracopulmonaire

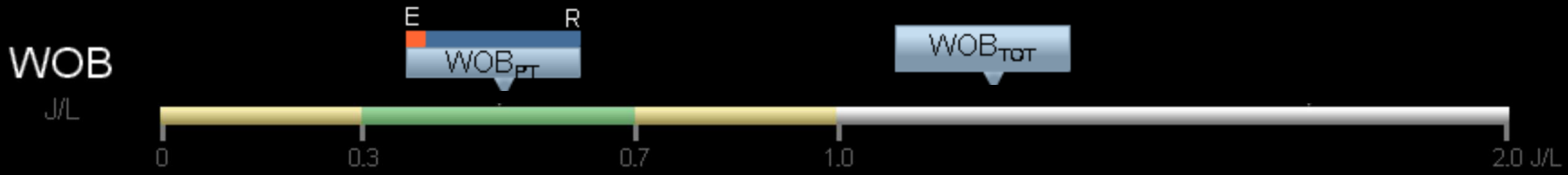


Ptot = Pmus+Paw
Paw= gain.Ptot
Pmus = Paw . (Gain/(1-Gain))

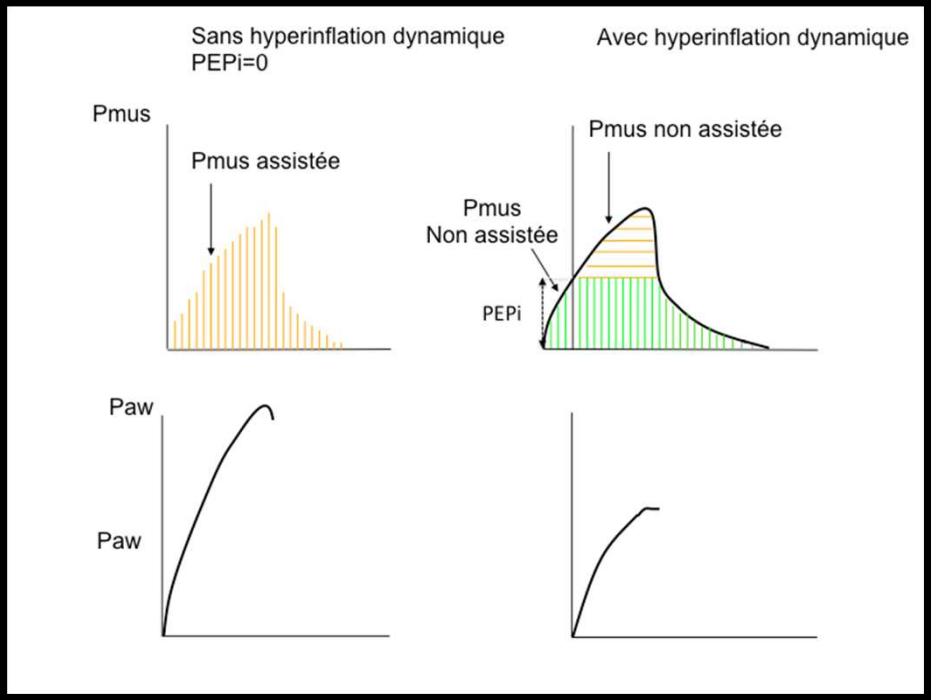

S
P PEAK
22
cmH2O
P MEAN
9.4
cmH2O
PEEP
2.9
cmH2O
I:E
1:1.5
f TOT
23
1/min
T I SPONT
1.20
s
V E TOT
12.7
L/min
V TE SPONT
591
mL
CPAV 35 mL/cmH2O
RPAV 9.2 cmH2O/L/s
PEEPI 2.9 cmH2O
PCIRC
cmH2O
PLUNG
cmH2O
VT
mL
O2 sensor disabled
Menu
Adult
SPONT
PAV+
50 kg
Manual Insp
VT 300 mL
ΔP
50
%
% Supp
70
%
VSENS
3.0
L/min
O2
100
%
ESENS
3
L/min
PEEP
3.0
cmH2O
O2
100%
01:22:16pm

↘ GAIN (%)

↘ Compliance



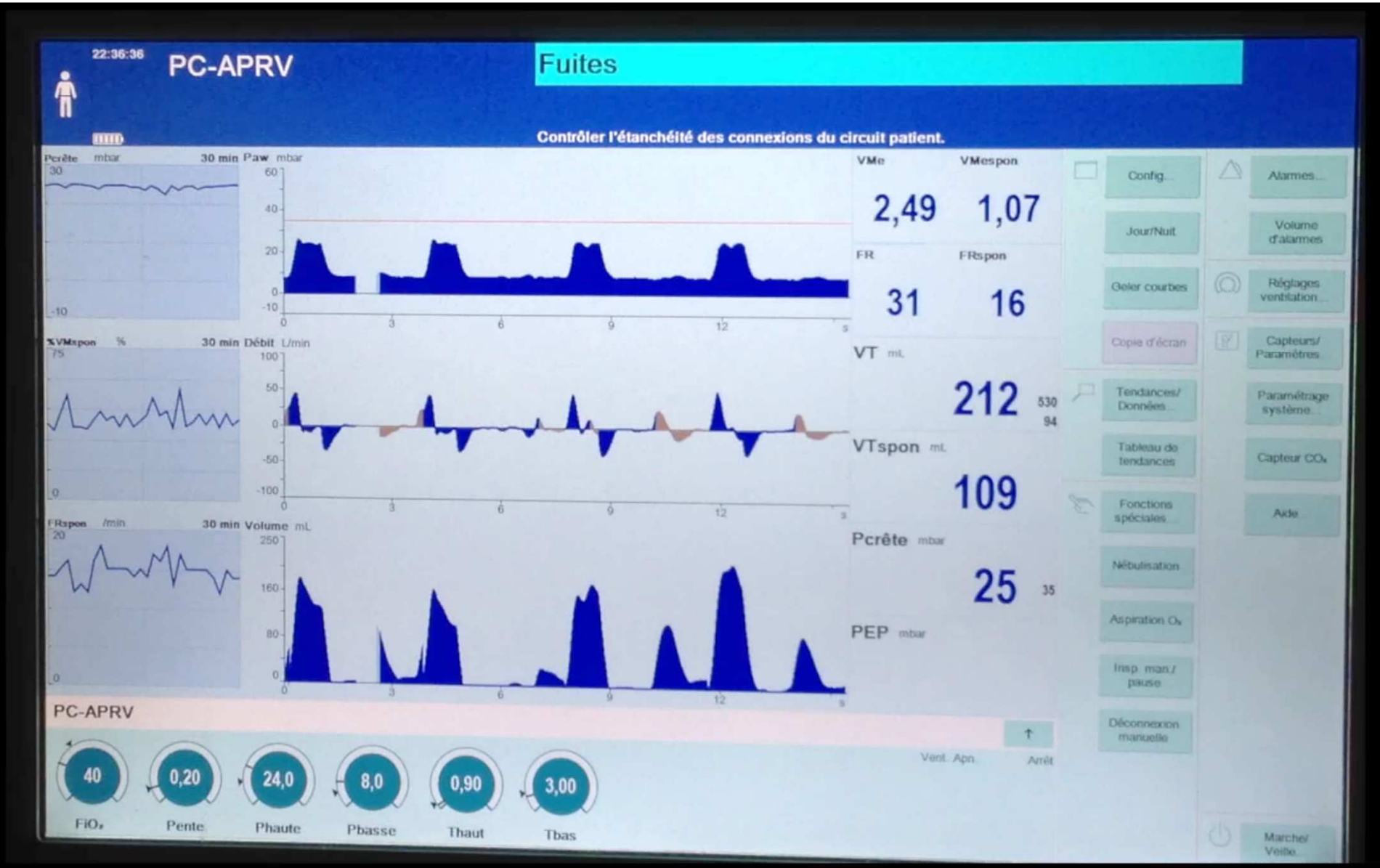
Connaître la compliance en VS



Titration de la PEEP de 2 en 2 cmH_2O et on observe la mesure de compliance (C_{PAV})

Clinical review: Biphasic positive airway pressure and airway pressure release ventilation

Christian Putensen[1] and Hermann Wrigge[2]



Conclusion

- Nouveaux modes plus si nouveaux
- Associés a des données supplémentaires EAdi, Ctp, Résistances, % VS.
- Pour mieux évaluer la situation clinique à un instant T, l’évolution